

NEW SPECIES OF PERIDERMIIUM

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A description is given in this paper of five new species of foliicolous *Peridermium* on pine in the eastern United States. The first three species have been proven by the writers by inoculations with the aeciospores under controlled conditions in greenhouses to be the aecial forms of species of *Coleosporium*. These are described and named to distinguish them from other species of the form genus *Peridermium* on pine needles. Types of these species have been deposited in the pathological collections of the Department of Agriculture at Washington, D. C.

I. *Peridermium ipomoeae* sp. nov., the aecial form of *Coleosporium ipomoeae* (Schw.) Burrill

Pycnia amphigenous, scattered or frequently numerous and arranged in rows, usually on the same side with or opposite to the aecia on light or yellow green¹ spots in the needles, olivaceous black, 0.11 to 0.36 mm. broad by 0.28 to 0.64 mm. long, averaging 0.24 by 0.41 mm.

Aecia flattened laterally, scattered, usually in a single row, 0.24 to 0.56 mm. high by 0.88 to 2.32 mm. long, averaging 0.4 by 1.6 mm.; peridial cells ovoid to elliptic or rhomboid in face view, mostly overlapping, 16 to 26 by 18 to 47 μ , averaging 21 by 41 μ , with walls 2 to 5 μ thick, the inner closely and finely verrucose; aeciospores ovoid to ellipsoid, 16 to 20 by 22 to 27 μ , averaging 18 by 25 μ , walls colorless and verrucose with somewhat deciduous tubercles 1 to 2 μ in diameter and 1 to 3 μ high.

Peridermium ipomoeae has been collected on the needles of the following species of pine:

On *Pinus echinata* Mill. in Alabama, Arkansas, Georgia, North Carolina, South Carolina, Texas, and Virginia.

On *Pinus palustris* Mill. in Florida and South Carolina.

¹ Colors used are those given in Color Standards and Nomenclature by Robert Ridgway, Washington, D. C., 1912.

On *Pinus rigida* Mill. in Georgia, Maryland, Pennsylvania, and South Carolina.

On *Pinus taeda* L. in Alabama, Arkansas, Florida, Georgia, and South Carolina.

The type of the species is Forest Pathology 22217, collected by Hedgcock on *Pinus echinata* at East Point, Atlanta, Ga., April 26, 1916.

2. **Peridermium terebinthinaceae** sp. nov., the aecial form of *Coleosporium terebinthinaceae* (Schw.) Arthur

Pycnia amphigenous, few, more or less aggregated near to or on opposite sides from the aecia on the needles, burnt umber to blackish brown, 0.15 to 0.31 mm. broad by 0.25 to 0.61 mm. long, averaging 0.19 by 0.42 mm.

Aecia tongue-shaped, few, usually clustered, fragile, 1.1 to 2.0 mm. high by 0.7 to 1.3 mm. long, averaging 1.4 by 0.8 mm.; peridial cells ovoid to ellipsoid, sometimes angular in face view, 19 to 30 by 39 to 66 μ averaging 30 by 50 μ , slightly overlapping, with walls 3 to 6 μ thick, the inner closely and finely verrucose with more or less deciduous papillae, 0.2 to 0.9 μ thick and 2.5 to 4.0 μ long; aeciospores, ovoid to ellipsoid, 19 to 23 by 30 to 36 μ , averaging 20 by 32 μ , walls colorless, 1.8 to 4 μ averaging 2.8 μ in thickness, closely verrucose with somewhat deciduous tubercles, 0.7 to 1.6 μ thick, and 1.0 to 2.3 μ long.

Peridermium terebinthinaceae has been collected on the following species of pine:

On *Pinus echinata* in Alabama, Georgia, North Carolina, and South Carolina.

On *Pinus taeda* in Alabama.

A form which may be this species has been collected on *Pinus pungens* Michx. f. in Georgia, and on *Pinus virginiana* Mill, in North Carolina.

The type of the species is F. P. 20994, collected by Hedgcock on *Pinus echinata* at Auburn, Ala., April 23, 1916.

3. **Peridermium helianthi** sp. nov., the aecial form of *Coleosporium helianthi* (Schw.) Arthur

Pycnia amphigenous, few, often solitary, usually very near the aecia, light brownish olive to olive, 0.2 to 0.5 mm. wide by 0.3 to 0.6 mm. long, averaging 0.4 by 0.5 mm.

Aecia flattened at first, often becoming tongue shaped when fully mature, few, usually clustered, 0.8 to 1.8 mm. high by 0.5 to 1.2 mm. long, averaging 1.3 by 0.8 mm., rupturing longitudinally with coarsely toothed edges; peridial cells ovoid to ellipsoid, 13 to 25 by 27 to 43 μ , averaging 19 by 40 μ , with walls 2 to 4 μ thick; aeciospores ovoid to ellipsoid, often pointed at one end, 15 to 20 by 20 to 28 μ , averaging 17 by 23 μ , with walls 1.2 to 2.8 μ thick, rugose with numerous small tubercles 0.6 to 1.2 μ thick, 1 to 2 μ long.

Peridermium helianthi has been collected only on *Pinus virginiana* but it probably will be found later on *Pinus echinata*. It has been collected in Pennsylvania, North Carolina, South Carolina, Tennessee, West Virginia, and Virginia.

The type of the species is F. P. 22236, collected by Hedgcock on *Pinus virginiana* near Greenville, S. C., Apr. 29, 1916.

This species is morphologically very similar to *Peridermium inconspicuum* Long, but proof is lacking of the identity of the two species.

4. *Peridermium fragile* sp. nov.

Pycnia amphigenous, single or few in one or two rows, either near to or on opposite sides from the aecia on yellow green to viridine green areas on the needles, dark olive to olivaceous black, 0.4 to 0.5 mm. wide by 0.5 to 0.9 mm. long, averaging 0.4 by 0.6 mm.

Aecia small and inconspicuous, flattened laterally, few, scattering or in groups, 0.4 to 0.5 mm. high by 0.8 to 2 mm. long, averaging 0.4 by 1.3 mm.; peridia rupturing longitudinally with irregularly notched edges; peridial cells slightly overlapping, ovoid to ellipsoid in face view, frequently pointed at both ends, 17 to 25 by 37 to 46 μ , averaging 21 by 41 μ , with walls 4 to 8 μ thick, the inner verrucose with numerous, crowded papillae 1.1 to 1.9 μ thick and 4.1 to 5.6 μ long, averaging 1.4 by 5.0 μ ; aeciospores ovoid to ellipsoid, 18 to 22 by 25 to 34 μ , averaging 21 by 31 μ , with walls 2 to 3 μ thick, the outer surface closely verrucose with irregularly arranged rows of more or less deciduous tubercles, 1.8 to 2.4 μ thick, and 1.7 to 3.2 μ long.

Peridermium fragile has been collected on *Pinus palustris* in Florida and Georgia, *Pinus taeda* in Florida, and on *Pinus rigida* in New Jersey.

The type of the species is F. P. 17426, collected by Hedgcock on *Pinus palustris* at Brooksville, Fla., Mar. 11, 1915.

5. *Peridermium minutum* sp. nov.

Pycnia solitary or few, or sometimes lacking, tawny to buckthorn brown, 0.2 to 0.4 mm. wide by 0.3 to 0.5 mm. long, averaging 0.3 by 0.5 mm.

Aecia scattered, usually in a single row on the outer side of the leaves, low and inconspicuous, flattened laterally, 0.3 to 0.7 mm. broad by 0.5 to 1.2 mm. long by 0.3 to 0.5 mm. high, averaging 0.5 by 0.7 by 0.4 mm.; peridia very delicate, rupturing longitudinally with finely fimbriated edges which recurve on maturity; peridial cells ovoid, ellipsoid, or rhomboid in face view overlapping but very little, if at all, 18 to 28 by 35 to 70 μ , averaging 21 by 48 μ , with walls 2 to 4 μ thick, the inner finely verrucose with papillae; aeciospores ovoid to ellipsoid to cylindric, sometimes pointed at one end, 14 to 18 by 26 to 38 μ , averaging 15 by 33 μ , with colorless walls 2 to 4 μ thick, the outer verrucose with blunt tubercles 0.8 to 1.4 μ in diameter, 2.7 to 3.4 μ long.

Peridermium minutum has been collected on *Pinus glabra* Walt., and *Pinus taeda* only in Florida.

The type specimen is F. P. 20768, collected by Hedgcock on *Pinus glabra* near Gainesville, Fla., Mar. 15, 1916.

In the study of various species of *Peridermium* it is found that the pycnia possess good diagnostic characters, not heretofore recognized, and a key to the species known in the eastern United States is in process of preparation in which these with other characters will be used.

It is also found that the peridial cells vary greatly in different parts of the same peridium. Even when cells from the sides and base of the peridium are twice as long as they are wide, the cells at and near the top are only about half as large, with width and length about equal and with walls much thickened. Since some of the basal cells can practically always be found it seems better to base the measurements on them alone.